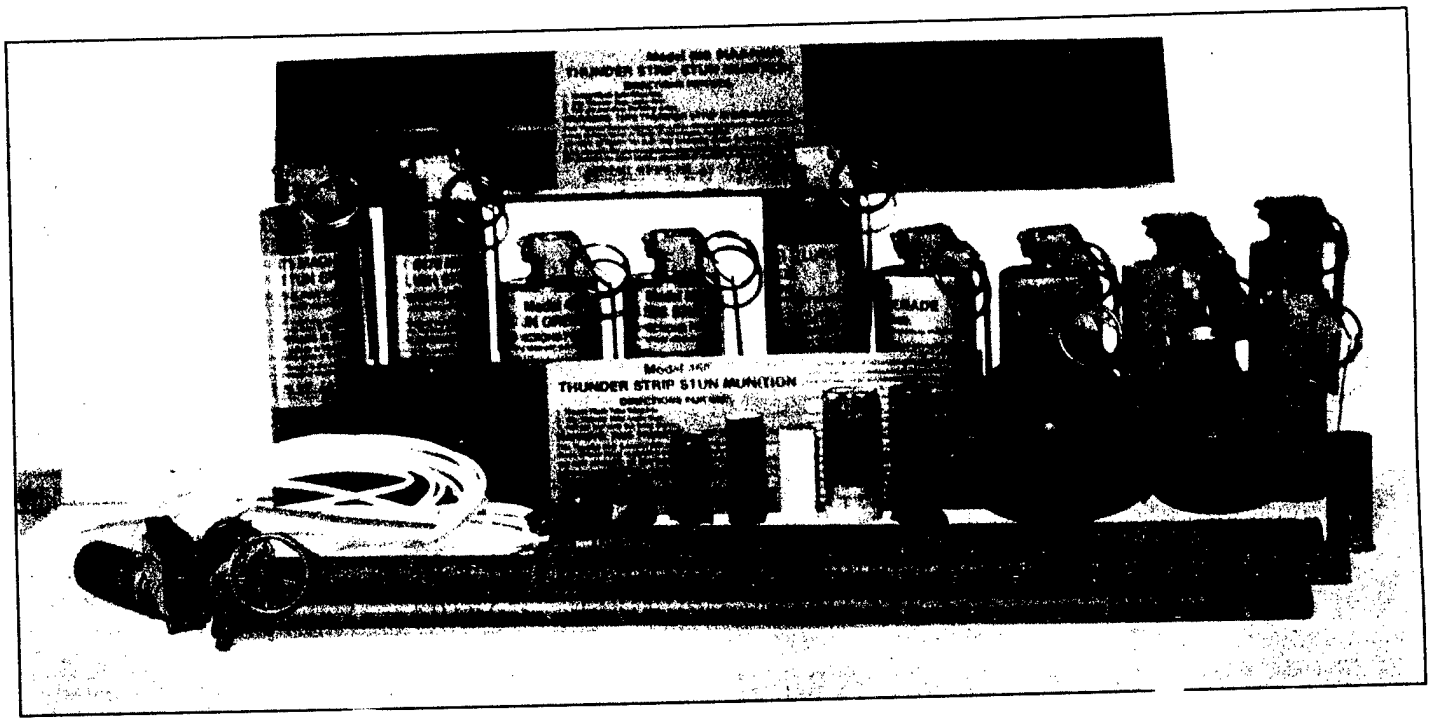
THE DEVELOPMENT OF BLAST-ACTUATED IMPACT MUNITIONS

SPECIAL PURPOSE LOW LETHALITY ANTI—TERRORIST MUNITIONS



SPLLAT MUNITIONS

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STUN GRENADES AND DIVERSIONARY DEVICES

There is little doubt that the single most important life saving development for law enforcement tactical officers since Richard Davis invented his Second Chance soft body armor in 1972 has been the introduction of Special Purpose Low Lethality Anti Terrorist (SPLLAT) Munitions.

Commonly (and sometimes incorrectly) called "Stun Grenades", "Flash-Bangs" or "Flash-Crashes", these unique life-saving munitions not only provide a decisive tactical advantage to the arresting officers, but have often saved the criminal's lives as well as any hostages and/or innocent bystanders, including the police themselves.

When a properly selected SPLLAT Munition is utilized correctly, even the most violent and dangerous armed felon can be instantly rendered incapable of effectively resisting capture. Since the perpetrator is instantly, but only temporarily, incapacitated he cannot shoot at the police, so, in turn, they do not have to use deadly force to effect his capture. Also, due to the instant incapacitation effect, the criminal will be unable to shoot any hostages present. An added benefit to all concerned will be the dangers caused to innocent bystanders by stray bullets whizzing through walls, down alleys and across streets.

While there a wide variety of SPLLAT Munitions available today for both military and civilian Counter Terrorist, Hostage Rescue, Mob and Riot Control SWAT Teams, they all function in basically the same manner. These devices, normally designed with a short (nominally one second) delay fuze, produce a stunning, disorienting blast and a brilliant, dazzling flash. This "double barrel" effect has proven quite effective in instantly stunning and effectively incapacitating even the most violent felon, permitting his subsequent apprehension with a minimum of risk to the arresting personnel.

Most importantly, due to the unique design of these SPLLAT Munitions, they perform this life saving mission with much less chance of serious injury or death that capture/rescue attempts that utilize only the old fashioned "Thompson Technology": (Shoot 'em all & let God sort 'em out!)

Since these unique, life saving munitions have been available for almost a decade, it is surprising to learn that quite a few agencies are either not aware of their capabilities or, for some reason, do not effectively utilize them in their tactical operations. At least not with the proper procedures necessary to assure their maximum effectiveness.

One of the least understood aspects of SPLLAT Munitions concerns the relative effects of their explosion. Basically, the explosion of either Stun or Distraction/Diversion (yes, there is a very significant difference and it will be covered shortly) consists of both Blast and Flash. Depending on the design of the particular munition, it will produce more or less smoke in conjunction with the explosion. In no case, however, should a properly designed SPLLAT Munition produce any

significant fragmentation, including the violent projection of either the heavy metal fuze body or parts of the grenade body itself.

Of the two basic grenade effects, blast and flash, it is the blast that is by far the most effective of the two. As a result of the feedback from literally hundreds of test firings and dozens of actual "field reports" it has become quite apparent that it is the blast that provides the majority of the effectiveness of the SPLLAT Munitions. While the flash can be very bright and can be expected to "dazzle" a suspect, it will only do so under the proper conditions. If a suspect is in a darkened room, his pupils are dilated, and he is looking directly at the munition when it explodes, it is reasonable to expect that the suspect will be temporarily dazzled and effectively blinded by the bright flash. If, however, the suspect is outdoors in the bright sunlight, or is in a well lighted room, either condition of which will cause his pupils to be contracted, the flash may well prove to be ineffective. Similar non-results can be expected if the suspect happens to shut his eyes (or even blink) just as the munition goes off, or if he has his back turned to the explosion or the explosion is otherwise shielded by furniture or other objects.

The blast, however, has been repeatedly proven to be the most effective portion of the explosion. It has proven to be a truly omnidirectional effect, with only minor shielding being caused by most common objects in a typical room.

The flash may or may not be effective, (because even a dazzled criminal can still fire a weapon), but the blast can be counted on to effectively, and instantly, incapacitate even the most dangerous armed assailant.

It is also important for a tactical officer to understand the terms "Blast" and "Explosion" and to have a feeling for what really occurs when a SPLLAT Munition goes off in the near vicinity of someone.

Basically, the explosion of almost all types of Stun and Diversion / Distraction Grenades/Devices consists of the extremely rapid burning of a mixture of very finely powdered metal "fuel" and a potent oxidizer (which furnishes the necessary oxygen for the rapid combustion). For the technically inclined, the metal fuels are usually magnesium or aluminum and the oxidizers are either potassium perchlorate or a similar chemical with a high oxygen content.

Since both of these chemicals are in the form of fine powders, they have a very large surface area, and thus, upon ignition, will burn extremely rapidly. In the normal sub-ounce size quantities found in most SPLLAT Munitions, this combustion is normally completed in a few thousandths of a second. Due to the heat of the burning, the resulting combustion gases are heated to a high temperature and expand very rapidly, quickly rupturing their container and releasing the compressed gases into the atmosphere. This produces the overpressure we hear (and feel) as the "BANG".

Burning is a surface phenomena and it's speed is directly dependent on several variables. Notably important are the

Multiflash (whose seven submunitions each produce 175 db at THREE Feet, and their M400 Safety Training Grenade are two good examples of the lower powered explosive devices that should never be relied upon to effectively incapacitate an armed felon. These lower powered devices will only distract him and divert his attention for a few seconds. Another important point to remember when utilizing the reusable, solid metal body grenades which have blast vent holes in their ends, is that the holes make the blast from the grenades extremely directional. The full power of such grenades will be experienced only when they are oriented end-on towards the suspect. If the grenade body is lengthwise to the target when the internal submunition explodes, a significant reduction in blast effect can be expected. In other words, the solid metal body grenades which are vented only on their ends can produce wide variations in their effectiveness. For maximum Tactical Reliability, non-fragmenting metal body grenades with side vents along the body are the better choice.

To repeat, anytime decibels are discussed in relation to the effectiveness of SPLLAT Munitions, the actual distance from the blast to the subject must also be included in order to make the information at all meaningful. Even though Precision Ordnance Products' M450 Multiflash Submunitions produce 175 db, they do so only at a maximum distance of three feet, whereas the M429 Thunderflash (a true STUN Grenade) produces the same blast level at a full seven feet.

Also, since the M429's Submunition produces a significantly greater amount of gas upon explosion than the M450's much smaller Submunition, even though both Submunitions happen to explode at their respective 175 db distances from the target, the larger M429's Submunition would be expected to be significantly more effective in incapacitating the suspect.

After determining the power level of the Grenade to be used for the specific task at hand, it is also important to consider the safety features inherent in the design of the Grenade itself. Extensive experience has shown that the safest design of Grenades are those that utilize an ejecting Submunition. Less desirable are those designs that either eject the fuze mechanism, or, even more dangerous, grenades that have the heavy, cast metal fuze screwed directly into the grenade's body where it becomes a potentially lethal projectile when the grenade explodes. Examples of the former design are the U.S.Government's Mark 141 Mod 0, which uses a plastic foam body as the explosive container. It's predecessor, the original FBI-designed M116 A-1 Hand Grenade Simulator, Modified, represents an example of the more dangerous design that throws the fuze. With such velocity that it can penetrate a sheet of 1/2" thick plywood! Such excessive penetration is certainly capable of causing serious injury or even death!.

An additional danger from the fuze-ejecting designs may occur in the event that careless handling of an armed or "live" grenade (pin removed and the safety lever being held down in order to permit rapid employment of the grenade) allows the safety lever to rise enough to permit the striker to slip under

chemical composition of the explosive mixture, the size of the chemical particles, and, to a lesser extent, the type and degree of confinement of the explosive mixture.

In contrast to the burning (or deflagrating) explosive mixtures, true High Explosives normally function by detonating. In a detonation, a shock wave (initially caused by a detonator) actually flashes through the explosive at velocities sometimes exceeding twenty five thousand feet per second. This is several orders of magnitude faster than any burning explosives, and, accordingly, High Explosives are normally many times more powerful than burning explosives. It should be noted that High Explosives can also be burned. When ignited in small quantities out in the open, they generally burn enthusiastically but with nowhere near the speed of flash powder. It is when detonated that High Explosives really demonstrate their true power.

For illustrative purposes, a golf-ball size lump of C-4 plastic explosive, when ignited with a match, will burn for a minute or so. However, that same explosive, if rolled into a one inch diameter "rope" four miles long, and detonated with a blasting cap, would be entirely consumed in about a second.

After bursting the wall of the SPLLAT Munition, the hot, rapidly expanding gases from the burning of the flash powder provide the blast or "over-pressure" shock wave that provides the major effectiveness of the SPLLAT Munition.

This pressure wave is measured in pounds per square inch of over-pressure. The over-pressure being the additional blast pressure in excess of the normal air pressure of approximately 14 pounds per square inch (psi) at sea level. In the normal functional range of true Stun Grenades, this over-pressure is relatively small, being on the order of ten psi or less. In fact, the most effective pressure operating range of a stun grenade is from five to ten psi. At over-pressures much in excess of ten psi, physical injury is likely to occur, while at levels under five psi, only a Distraction/Diversion effect may be encountered.

The most common method of expressing the power level of a blast is in decibels (db). The quantity of a decibel is somewhat tricky to understand, but fortunately, it can be related to psi, which everyone is now aware of - at least somewhat.

Fortunately for modern SWAT Teams, there is a readily available and inexpensive gauging system with which to measure the blast level of the small explosive charges found in SPLLAT Munitions. This is the Anderson Blasgage, available from Accuracy Systems, PO Box 41454 Phoenix, AZ 85080, price $100 per set. This set includes both the Blasgage itself (two 8 1/2" by 11" sheets of 1/8" thick aluminum plate, with ten matching sets of holes which provide the actual "Blasgages"), and 500 sheets of Blast Test Paper. A Special Mounting Bracket w/ Stand is priced at $375 each. (Blasgage extra).

The Blasgage set includes a Conversion Chart which provides a comparison of the relationship between Decibels (db) and Blast Over-Pressure (psi). As a quick inspection of the comparison table will show, there is somewhat of an overlap in the listed ranges of the psi and db. For instance, 175 db can be found

to occur anywhere between .9 psi and 3.0 psi. There are some scientific explanations for this relatively wide variance, but a good, basic explanation is that the relative effectiveness of the blast of a SPLLAT Munition is not an exact science. Anymore than are the terminal ballistic effects of handgun bullets. Anyone long in the field of tactical law enforcement will have heard stories of suspects collapsing from a single hit with a .22 rimfire as well as those who received multiple hits from shotguns or rifles and still went on to kill the arresting officer.

To add some practical meaning to the effectiveness of SPLLAT Munitions, it can be stated that based on the reports of dozens of actual uses in the field, under actual tactical conditions, that a properly selected STUN Grenade when used correctly, will result in an essentially instant incapacitation of even the most determined criminal with something approaching a 90+% reliability. And with a corresponding potential of assuring this instant incapacitation without serious injury.

It is extremely important, however, to correctly define the exact definition of a true STUN GRENADE.

Of additional interest is the fact that decibels are measured by what is scientifically known as a "Logarithmic Function". What this means is that for every ten decibel increase in blast level, you actually double the blast pressure. For instance, in going from 175 db to 185 db, the blast pressure increases from an average of 2.5 psi to about 5.5 psi. Note that the term BLAST LEVEL was used and not BLAST EFFECT. The actual physiological effects on the suspect will be increased in going from 175 to 185 db, but they do not necessarily double.

Years of practical experience and numerous field reports have established the fact that to be considered an effective STUN Grenade, the munition in question must produce a blast level of at least 175 db at a distance of seven (7) feet from the point of explosion. The inclusion of the distance factor is extremely critical in describing the blast (decibel) level of any explosive device, Stun Grenades included.

For instance, a 20 KT Nuclear Bomb will product a blast level of 175 db at a distance of several kilometers. As will an empty, primed .38 Special cartridge case in a 2" Chief's Special if the muzzle is inserted directly into your ear.

Another interesting comparison of pressure levels is that the RATE of pressure application is very important. For instance, if you dive down to the bottom of an ordinary swimming pool, your body will be subject to overpressures on the order of a Stun Grenade. However, due to the relatively slow rate of application, no apparent damage will result. A similar demonstration can be made by slowly pressing the palms of the hands over the ears. Press slowly and only minor discomfort is felt. However, a good sharp slap will create extreme pain, even possible rupturing the ear drum.

Any Grenade or other Munition that produces a blast level below 175 db at 7 feet should be more correctly described as a Diversion/Distraction Device than a true "Stun" Grenade.

Grenades such as Precision Ordnance Products' M450

it and strike the primer in the fuze. One second later the Grenade will function. If it is the Submunition-ejecting design (similar to Precision Ordnance Products' M429, M459, M416 , etc.), the explosive-filled Submunition will be ejected out the bottom of the Grenade's main body prior to it's explosion. If, however, the grenade is of the MK 141, fuze-ejecting design, only the fuze will be ejected and the grenadier will be left holding the explosive charge. At least for a fraction of a second before it explodes! Right in his hand! Obviously the M116 A1 fixed-fuze design will not even give that fraction of a second of a warning. It will just instantly blow the grenadier's hand off!

In addition to evaluating both the basic safety of the design (submunition ejecting or non-submunition ejecting) and the power level (STUN or DIVERSION/DISTRACTION) of the SPLLAT Munition to be selected, the user should also be aware that there are several other very interesting and tactically useful designs of SPLLAT Munitions available on today's market. These include Thunder Rods, which are, as the name implies, long,rod-like Munitions that are designed to be inserted through a small hole through a door or wall. These holes are usually made by using a 12 gauge shotgun with a frangible slug, such as the SHOK LOCK made by Precision Ordnance Products. Thunder Strips (these are nominally foot-long strips of thin, corrugated plastic which are filled with explosive and fired by means of a remote fuze assembly attached to a short length of flexable, hollow plastic Flashtube), which are designed to be inserted under a closed and locked door in order to produce an incapacitating, stunning blast inside the otherwise secure room. There are also Launchable Stun Grenades, which, while physically similar to Thunder Rods, are made with a special Plastic Obturating Cup on one end. In practice, the obturating cup end is inserted into a 12 gauge riot shotgun's muzzle, the safety lever secured by means of either a Shok Lock Adapter or a rubber safety-lever retainin device, the Safety Pin removed, and the M444 is then fired by means of a special M444 Launching Blank. The range of these launchable grenades is approximately 75 meters, and they are a lot more accurate than regular hand thrown grenades. They can even be fired through most standard glass window panes. While not of "Match Grade Accuracy" they are certainly a lot more accurate (as well as longer ranged) than any hand thrown grenade.

For tactical applications requiring the maximum amount of visual acuity, there is even a "Smokless" Stun Grenade available from Precision Ordnance. Their M416 MINI SMOKLESS Stun Grenade represents the current state-of-the-art in SPLLAT Munitions. The M416 is significantly smaller that any similar powered Stun Grenades, and in addition, it's explosion produces less than 10% of the smoke of other types of grenades. Added benefits are that since the M416 is designed with a different type of explosive loading than other grenades, it is also less likely to start fires. Also, it's flash is appreciably less than the other grenades, which can be a benefit when the entry teams are utilizing multiple grenades in darkened rooms. They

will have a much less likelihood of dazzling each other.

While on the subject of "Dazzling" it should be noted that there are also STARFLASH Grenades available from POPI. In addition to the blast and flash of the standard grenades, the Starflash Loading produces a brilliant shower of whitehot, sizzling "Sparklets" that provide a significantly more enhanced Diversion/Distraction Effect. Examples of the Starflash Grenades are the M451 Multi Starflash (similar to the M450, in that it ejects seven individual submunitions) and the M459 Starflash which has a single, large Submunition like the M429 Thunderflash.

The M470 and M471 are Magnum versions of the M429 & M459. These larger grenades contain approximately twice the explosive loading of their smaller contemporaries, and are intended for utilization in outdoor applications, in large buildings such as warehouses and aircraft hangers, and in tactical situations requiring an enhanced degree of effectiveness for the safety of all concerned.

One of the most important safety rules to observe concerning the use of any type of exploding munition is NEVER to expose friendly personnel to the effects of the full power Stun Grenades. No matter how well these grenades are designed and manufactured, there is always the possibility of a malfunction of some type. Or, more likely, the explosion may occur close enough to some other object to propel it with the chance of harmful results. This potentially dangerous situation is known as Secondary Fragmentation. Knowledgeable officers do not test their body armor by wearing it while it is being shot. Neither should they be exposed to potential injury, remote though the chance may be, by needlessly placing themselves in harm's way when training, testing or using the full power stun grenades.

An equally important Safety Rule is to ALWAYS have adequate Medical and Fire Suppression Support immediately available anytime Stun and/or Diversion/Distraction Grenades are used, either in training or in actual tactical operations.

It is also highly recommended that any potential user of these unique, life-saving SPLLAT Munitions make arrangements to attend one of the User Certification Courses that are offered by Accuracy Systems Ordnance Corp. PO Box 41454, Phoenix, AZ 85080. Telephone (602) 433-9375 or FAX (602) 433-9375.

Not only will the student receive a good basic training in the safe and proper techniques to use when employing SPLLAT Munitions, but graduates will also receive a Certificate from the factory stating that the Graduate has been properly trained by the Factory Experts in the Safe and Proper Tactical Utilization of SPLLAT Munitions.

In any event, today's modern tactical officer should always remember it is no longer necessary to shoot and kill a suspect.

In fact, today's Motto should be:

"DON'T SHOOT 'EM - SPLLAT 'EM"!

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